Nov. 19'02

POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things." Written so you can understand it.

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Remarkable Performance of an Automobile

Most Daring Feat Ever Attempted with a Motor Vehicle to Demonstrate its Perfect Control

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THE FEROCIOUS AUTOMOBILE IS TAMED.

Roaring and Pitching Inhabitant of the City's Wilderness of Walls Submits to Complete Control.

The automobile is becoming tamed. It was formerly believed to be something like the zebra, the lion or other wild animals of the dark continent that defied the efforts of man to effect its subjugation. Like a wild bronco of the Texas plains it would buck, and lunge and pitch until few had the nerve to tempt its ferocity. Sometimes it would charge backward when the chauffeur tried to make it go forward and sometimes it darted forward when he wanted it to go back. It would switch around sideways, jump upward and endways and in fact it was a hard matter to tell which way the "mechanical beast" would go when the lever was touched.

But now all these troubles of the automobilists are over. Automobile trainers have become expert in their work. They have so completely subjugated the former wild, rearing, untame thing that it is now as docile as a work horse. No longer does it tear down a crowded street, despite the chauffeur's efforts to stop it; nor does it plunge into street cars at the crossings or suddenly take a notion to make a speed test run when the chauffeur has left it to stand for a while. To demonstrate the abject submission this once proud, ferocious creature has undergone it is but necessary to glance at the front page illustration. Here is a chauffeur making his automobile climb on top of a house. He is running up an inclined track, 42 78-100 per cent grade, the wheels on either side being supported by wooden rails but little wider than those of a railroad. This feat was performed in Chicago and is considered the most remarkable ever attempted by a motor vehicle in any country. It was done by its manufacturers to demonstrate its complete control, wonderful power and grade climbing ability.

COUNTRY LIFE VERSUS THE CITY.

Peoples' tastes are reverting to the country where they are placed in closer touch with mother nature, according to the statements of the Hon. Thomas F. Walsh in an interesting speech before the Tenth National Irrigation Congress. He spoke of the allurements of the cities that draw to them the cream of our young men and women and cause them to roll up to portentous populations. But he says it is now getting stylish to live in the country; that wealthy city people are buying up the old abandoned New England homes and many now spend as much as six months in a year on the farm. Continuing he says:

The boys and girls who grow up in the great city learn from the beginning their dependence upon others. They must work for others as a means of livelihood, as their fathers are doing. They must live in houses which other men own. Why, mother cannot have a new sink in the kitchen without first petitioning the landlord and convincing that august personage that the expenditure is really demanded in the interests of economy or comfort.

Ah, how different it is with that family when they acquire their part of the national heritage—a little irrigated farm in Colorado, in Idaho, in California or any other of our beautiful Western States. The soil which they press is their own soil. The roof that shelters them is their roof. Now father works for himself and for his babies. When mother needs a new sink in the kitchen there is nobody to ask except the man who loves her. This is freedom. What does it mean to the nation to have millions of people gradually pass from the servitude of the town to the sovereignty of the country? It means, my friends, the enlistment of a new army for the defense of the Republic in every hour of need. Give a man a home upon the soil and you have made him into a patriot who will defend your institutions at the ballot box and on the battlefield.

WIRELESS MESSAGE SPANS THE ATLANTIC.

Said to Assure Success of Marconi System for Transatlantic Communication.

The longest message ever transmitted by wireless telegraphy has just been received on board the Italian cruiser Carlos Alberto, according to the statements of Commander Martin. The message in its transit spanned the Atlantic ocean, coming all the way from Cornwall, England, to the cruiser stationed near Sunney Harbor off Nova Scotia. The Carlos Alberto, on which Marconi is using his experiments, was able to send messages only 150 miles but according to report could receive at any distance. Several of the messages it is said were received from the Cornwall station during the trip of the Cruiser, most of them being messages of congratulation from the Czar of Russia and King Humbert. The messages were all received in the Morse code and were completely taken. The distance from Sunney Harbor to Cornwall is greater than that from Tablehead to Cornwall where the station is being built. This experiment is said to completely assure the success of wireless telegraphy as a means of transatlantic communication.

FIRE DELAYS WORK ON THE GREAT EAST RIVER BRIDGE.

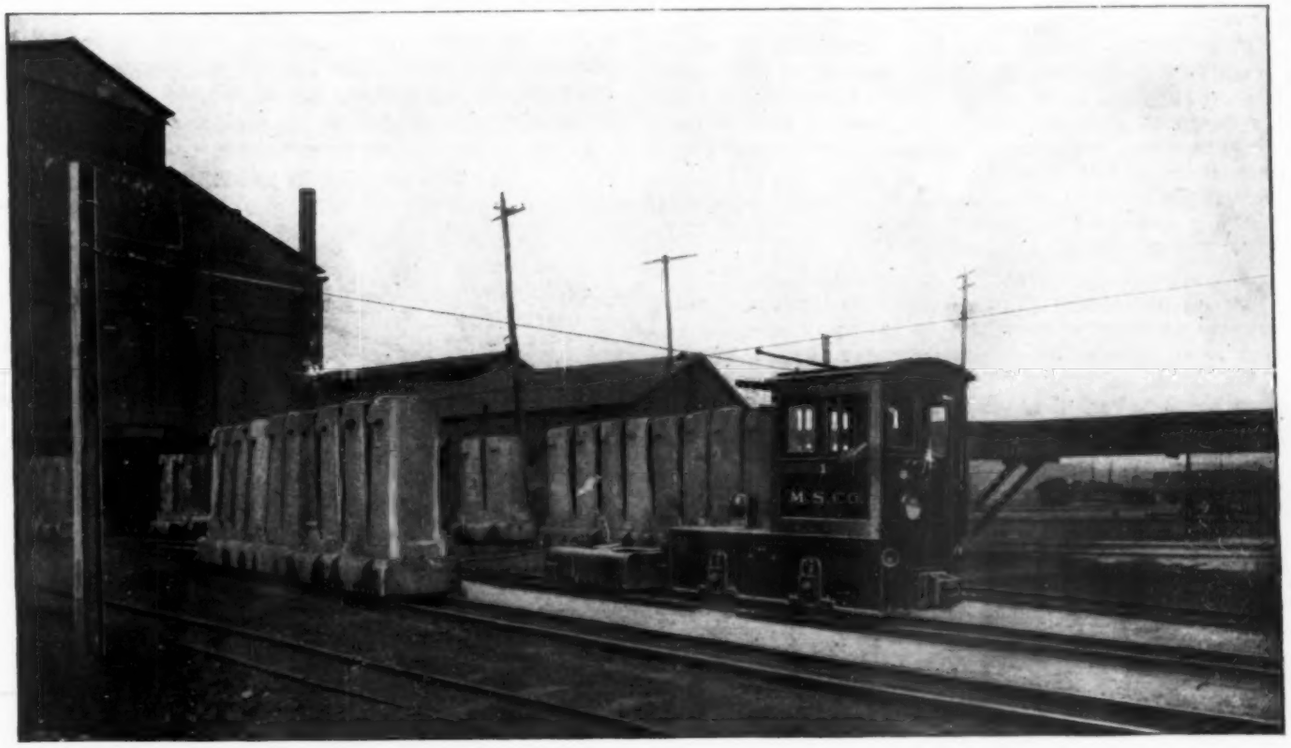
Longest Suspension Span in the World Attacked By Disastrous Conflagration.

The burning of the partially completed new East River bridge at New York, November 10, will cause a delay of at least four months in completing the huge structure, which was described in the last issue of Popular Mechanics, as the longest and greatest suspension bridge in the world. Chief Engineer Martin, in charge of the bridge construction, informs Popular Mechanics that two of the four cables resting on the saddles will have to be partially replaced by splicing. Only one of the four steel saddles, weighing 34 tons, on top of the tower, sustained serious damage. Under the main cables the temporary bridges were suspended from four small cables, and these were burned off and fell. The fire began in a little workshop on the south side of the New York pier. It spread rapidly all across the top of the tower through 50,000 feet of lumber stored there. The total loss amounts to about $600,000. The damage to the tower, the materials and tools on it is estimated at $75,000. The fire was at the top of a skeleton steel structure 333 feet in the air. It was fed by 20 or more barrels of lubricating oil, thousands of feet of lumber and a lot of inflammable material for wrapping the big cables. The firemen were forced to face almost unsurmountable difficulties.

MACHINES FOR EXTRACTING ESSENCE FROM LEMON PEELS.

The important part of this machine consists of two disks of about 4⅞ inches diameter each, the surfaces of which are indented like a nutmeg grater, so as to hold the peel in place, reports U. S. Consul Heingartner from Catania. The disks are placed opposite each other. In the first movement, they separate about 3½ inches, and receive a half peel (previously deprived of the pulp) from a wheel, the spokes of which project about an inch above the rim, which places the peel between the disks just before they meet. The disks revolve in opposite directions and squeeze the essence from the peel without breaking it. The peel is then ejected automatically and a fresh one is inserted. The essence as it is extracted is gathered in sponges placed under the disks. The disks can hardly be seen, being hidden by two cups, which prevent the escape and evaporation of the essence.

Electric Locomotive Development--Part V.



ELECTRIC SWITCHING LOCOMOTIVE.—The above illustration shows an Electric Switching Locomotive in use at the Maryland Steel Company's Plant at Sparrow's Point, Maryland. It weighs 5 tons, is 20 inch gage, and equipped with 7 1-2 horse-power motors. In a service test the locomotive developed 35 horse-power, the motors carrying an overload of more than 100 per cent for a considerable period.

CHEMICAL SYSTEM OF COOLING FRUIT CARS.

The time may come when the thousands of tons of ice which are used every day to keep the refrigerator cars cold will be a thing of the past. Chemists are working on a plan to keep the cars cold by means of chemicals. Ice and Refrigeration describes a new process and says:

Briefly, the process consists in lining the car in which perishable produce is to be shipped with zinc, or in any other way making it air-tight, and then as soon as the car is loaded, subjecting the contents to the fumes or gases arising from the combustion of a chemical mixture or powder, the composition of which is carefully guarded. The object, apparently, is to exclude oxygen by replacing the atmospheric gases with some heavier gases. This, at least, would be the presumption, judging from the reports thus far made public.

One inventor trying to solve the problem recently lost his life by being overcome by the fumes and gases of the chemicals with which he was charging a car.

Japanese auctions are conducted on the silent plan. Each bidder writes his name and bid upon a slip of paper, which he places in a box. When the bidding is over the box is opened by the auctioneer and the goods are declared the property of the highest bidder.

A watchman's timing indicator, which is said to be a vast improvement over the old method of registering with keys, has been invented by T. H. Watson, of Dayton, O. It is built on the style of a watch and is carried as such.

DEDICATION OF THE GREAT NILE DAM.

Impressive Ceremonies to Honor the Achievement That Will Reclaim Egypt's Arid Lands.

Impressive ceremonies will mark the dedication of the Nile dam at Assouan Dec. 10. The Duke and Duchess of Connaught will arrive at Cairo, Egypt, Dec. 6 where they will be joined by the Khedive of Egypt and with others of the royal party will depart next day for Assouan. On the day following the dedication of the Assouan dam, the supplemental dam at Assiout, will be inspected, after which the party will return to Cairo.

The Assouan dam, which has been previously described in Popular Mechanics, is the greatest work of the kind ever attempted. The construction has cost more than $25,000,000. It is nearly 1½ miles long, 138 feet high and is pierced by 180 sluice gates which are opened and shut by machinery and regulate the flow of water in the river. The supplementary dam at Assiout, a few miles up the river, is intended as a reinforcement of the great dam to assist it by breaking the force of the spring floods and restraining them in a local reservoir capable of storing more than 1,000,000 cubic feet of water. By means of these dams the surplus water will be stored during the rainy season and released in time of drought. This system of irrigation will make capable of cultivation vast areas of what is considered the richest soil in the world and the effect on the food market of the great harvest thus obtained is worth considering.

Mexico possesses the smallest newspaper in the world. It is called El Telegrama (The Telegraph) and is published in Guadalajara. It is but four inches square and contains four pages.

CEMENT SPANS IN BUILDINGS.

System Now So Popular, Introduced in France 25 Years Ago.

The system of building cement floors with the aid of steel rods or wire—the cement being packed over the latter—which is now attracting so much attention, was introduced in Paris by Monier 25 years ago. Since then, however, many things in detail have been introduced in perfection of the system. The cement floors are built in residences and other types of buildings, except skyscrapers. The largest spans of cement flooring, 25 feet, are in the new building of the school of education at the University of Chicago.

E. C. Shankland, constructing engineer, says:

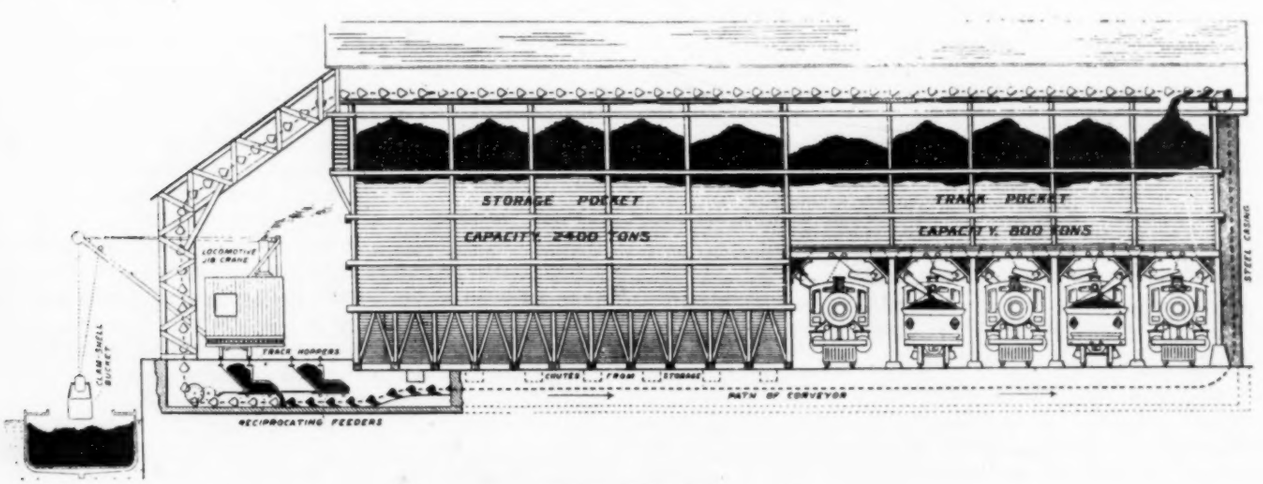
"At the present time there are many systems of concrete reenforced with steel in vogue, any of which will carry any vertical loads likely to come upon them, but they all lack side stiffness; that is, in case of tall buildings, where pressure of wind has to be considered, floors made of this construction are not to be compared to steel beams filled in with hollow tile arches, on account of the greater side stiffness of the latter. Furthermore, concrete is not nearly as fireproof as tile, which like brick, goes through the fire in its manufacture. Still concrete and steel construction is vastly superior to the so-called 'slow burning' construction. Its use in warehouses which would otherwise be built 'slow burning' and especially its use in flat buildings would be of inestimable advantage."

MODERN METHOD OF COALING LOCOMOTIVES.

Well within the recollection of men not yet gray was the time when trains used to stop at frequent intervals while all hands threw great chunks of wood into the tender. The wood-burning locomotive is now a curiosity and coal, the great fuel for railroads, is consumed each year by the millions of tons. Labor saving machinery has been perfected which enables the loading of an engine in a moment. The illustration shows one of these great coaling plants where human hands do not touch the coal from the time it leaves the boat until it is ready to burn. The Railroad Gazette says:

The arrangement of the machinery is shown in Fig. 1. The elevator-conveyor encircles the track pocket, the auxiliary storage, and the two delivery tracks. The locomotive revolving crane operates on one of the delivery tracks and is equipped with a clam shell bucket which delivers coal from the barge to the hopper under this track. The auxiliary storage is tributary to the elevator-conveyor, thus allowing the coal to be delivered to track pocket without shoveling. The track pocket spans the five coaling tracks so that five locomotives can take coal simultaneously.

The machinery is so equipped and arranged as to insure the most economical handling and minimum breakage. Conspicuous in the equipment of the machinery is the device for uniformly feeding coal to the conveyor, and the gates under the track pocket which positively cut off the flow of coal when the tender is filled.



Railroad Coaling Plant

THE LATEST IN TOOTHPICKS.

The latest thing in toothpicks comes from far-away Arizona. The new picks are made from the "niggerhead" cactus and are the most perfect yet devised. The process of making them has been patented by E. S. Rogers of Mayer, Ariz. Rogers gathers the "niggerheads" in large quantities, brings them to his workshop and with a pair of shears such as tinners use, he shears off the thorns. Then they are treated to various chemical baths, thousands of them at a time, from which they emerge brilliantly colored through the removal of the surface, yet rendered even more pliable than before, instead of more brittle, as might occur if not properly treated. The points are then slightly dulled by machinery, and they are ready for boxing and sale as "Indian souvenir toothpicks." They can be sold almost as cheap as a good quality of wooden picks, are as durable as quills and a genuine novelty.

FOR TUNNEL UNDER ENGLISH CHANNEL.

Proposals for tunnels under the English channel have frequently been before the public, and one has often been discussed; in fact, between 1800 and 1870, no fewer than eighteen proposals were put forward—eight from the French side and ten from the English. Since then the subject has often received attention, and in 1876 the memorandum of the basis of a proposed treaty between the two countries was issued. In the same year, too, boring was commenced near Calais. In 1882, Sir Garnet Wolseley and other officers expressed their disapproval of such a tunnel, and the work was stopped by the government. Later on, in 1887, boring was going on, but the tunnel bill was rejected by the House of Commons in August in that year. They may get it, but it is quite evident that it will be some time yet before timorous sailors will be able to make the passage on a railway.

All mills in Japan run day and night and change hands at noon and midnight.

BEST PRESERVED OF AMERICAN RUINS.

Mission Conception Where Dick Rutledge Was Imprisoned Is an Imposing Structure.

The best preserved of all the ruins of "forgotten American history" is the Mission Conception, shown in the accomanying illustration. Like the other old missions, convents and cathedrals that rear their walls amid the solitudes of the far west,

Mission Concepcion

this edifice was built in an early day of our history by the Franciscan monks. No building of modern days is so strong of construction as this, or other of the American ruins. It is beautiful in its architectural design and splendid even in its decay. Like the other ruins, the Mission Conception, which stands near San Antonio, Tex.. commemorates many bloody fights. deeds of heroism and other historical events that occurred during the wars between Mexico and the Republic of Texas. It was here that Dick Rutledge, once regarded the wealthiest man in Texas, and who devoted his wealth and his energies to freeing Texas from Mexican bondage, was imprisoned by an army of Mexicans who were seeking his life. Rutledge was an officer in Fannin's command which, while marching on the western plains, was threatened with famishment from thirst. Rutledge and five inferior officers were sent in search of water. It was while they were away that all the rest of Fannin's command was blindfolded and shot at the memorable massacre of the Goliad. The six Texans were captured, imprisoned in the Mission Conception and later sent to the City of Mexico to draw lots with other captives for their lives Those drawing a black bean from a casket were to be executed and those drawing a white bean were promised their lives. All, however, were shot regardless of their fortune excepting Rutledge, who escaped and by many hazardous adventures reached the Texas border, being the only one of the famous Fannin command to live.

A Norwegian has invented a machine which will turn out 20,000 sardine tins a day. Heretofore a skilled workman has been unable to make more than 600 tins daily.

Every square mile of sea is said to contain some 120,000,000 fish.

ASTOR GIVES TO THE WORLD HIS PATENTS.

Millionaire New Yorker Dedicates His Marine Turbine to the Public.

Col. John Jacob Astor has given to the world for public use his valuable patents on marine turbines. In his announcement he states:

"All my patents on marine turbines having been granted, I hereby dedicate them to the public in the hope that the development of the ideal turbine may be hastened thereby."

As yet no engine has been built to utilize Col. Astor's patents, but engineers and critics express themselves as sharing the belief that his theories will work out practically. Col. Astor's invention contemplates twin screws, set tandem, instead of side by side, and revolving in opposite directions. The inventor gives this description of his turbine:

"The turbine is shaped like a funnel and comprises an outer shell or drum and an inner shaft running axially through it, these parts being relatively rotable and each having oppositely set spiral blades. The steam is admitted into the outer shell at the small end and passes through the turbine, expanding into the large end of the shell and acting on the spiral blades to rotate the shell and shaft simultaneously and in opposite directions.

"By allowing both inner turbine and the outer case to revolve the speed necessary to insure efficiency, which in ordinary turbines is often inconveniently high, is cut in half. As a result of this construction the weight is reduced practically."

GREAT VALUE OF WALNUT STUMPS.

Walnut stumps are assuming undreamed-of value in Tennessee. An Indiana concern has had men traveling all over the country buying every old walnut stump that could be found. At first the prices were small, but they have now leaped out of sight. The stump of a tree which was felled several years ago brought more than the trunk and branches. The odd part of it is that the uglier, knottier and more unsightly a stump is the more money it will bring. It is stated that the stumps are made into veneering material and used in the manufacture of high-grade furniture.

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AGRICULTURAL IMPLEMENTS IN FRANCE.

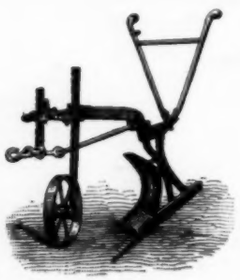
Machines That Look Queer Beside Our Improved Methods.

By Robert E. Skinner, U. S. Consul General, Marseilles.

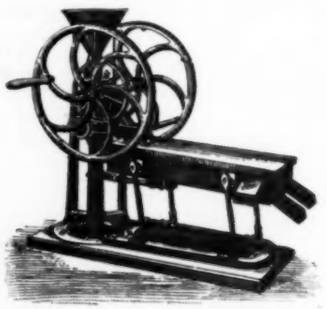
American farm machinery is finding a great demand in France since the farmers here have had an opportunity to compare the working of American and French implements. Many of the machines used here would amuse the farmers of our great agri-

Threshing Grain by Hand

cultural districts. For instance much of the grain is threshed with small hand machines worked by one man and a boy. This is explained by the fact that so many of the French farms have only 50 acres, and much of the wheat grows on the mountain side where it has to be cut by hand with a sickle. Larger



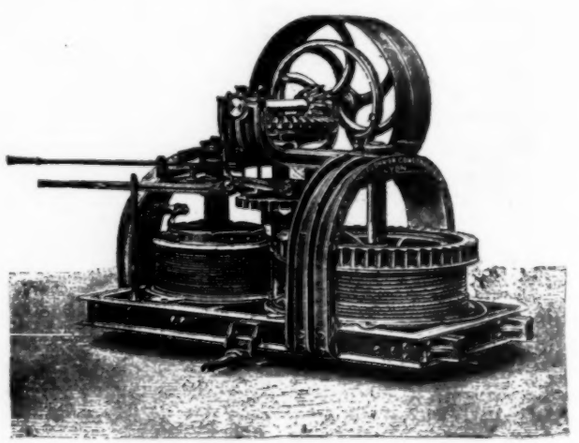
Vineyard Plow



Hand Flour Mill

threshers are worked with oxen. The hand threshing machine only costs $21.30 with $15 extra for connection to a horse-power. Hay is baled by hand and one seldom sees a power baler such as we use.

In the grape district a cultivator drawn by a windlass driven



Windlass for Drawing Plows

by steam power is frequently seen. Such an outfit, exclusive of the engine, including half a mile of steel cable, can be bought for $752.

Frequently the farmer is his own miller, using a hand mill which will grind 30 pounds of flour an hour. These mills cost $64.

BELGIANS BURN THEIR SMOKE.

In Brussels, Malines and other Belgian towns a novel method of not only getting rid of smoke, but turning it to good account, has recently been employed. The smoke is driven by a ventilating fan into a filter filled with porous material, over which a continuous stream of petroleum, benzine, alcohol, or some liquid hydrocarbon flows. The result is that the smoke is entirely suppressed, while the filter yields a gas of great heating power, which can be used for domestic purposes and for driving gas engines. The filtering material itself also becomes a good combustible during the process.

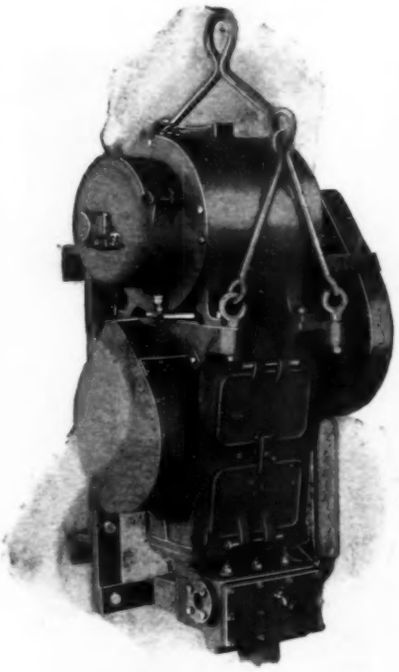
BIG AUTO SHOW IN PARIS.

The greatest exposition of automobiles, gasoline launches and air ships in history will be held in Paris from December 10 to 25. Demands for space should be addressed to the Commissariat General de l'Exhibition, 6, Place de la Concorde.

Raise Water From Deep Shafts

Electric Pumps Have Worked a Great Innovation in Mining Methods

Wonderful economy and a heretofore unknown degree of convenience in operating mines have come with the advent

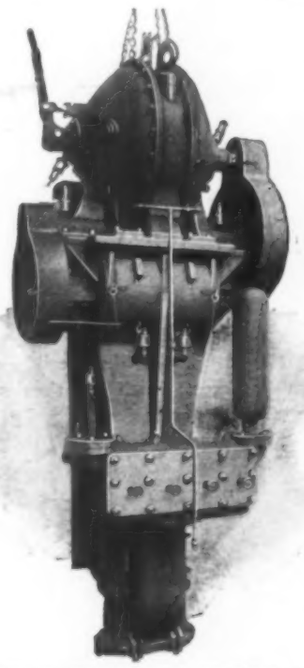


A 3x4 Triplex Sinking Pump, with Direct Current Waterproof Motor

of the electric mine pump. Electric pumping outfits are now being installed in many of the great mines of the country and the result seems to presage a complete obliteration of the old time methods. Electric pumps, stationary and movable, of numerous designs to answer all purposes, are now made. Probably the most unique of these are the little mine sinking pumps. They are lowered into the bowels of the earth as deep as 350 feet and the more powerful of them can pump out as much as 313 gallons of water a minute. The sinking pumps are designed to be lowered in a vertical shaft from which water is to be removed, and temporarily supported by four stout hooks or spurs driven into the timbers of the mine shaft. They are operated by motors which are entirely enclosed. Light, compact and of good capacity and efficiency these pumps, if possible, reveal the great advantages of electricity in mine pumping more clearly than do the pumps of the stationary type. The casing is water tight and the motor will work as well under water as without and may be submerged by a sudden rush of water without affecting its operation. Two of the sinking pumps are shown in the accompanying illustrations. They are made by the General Electric Co., Schenectady, N. Y.

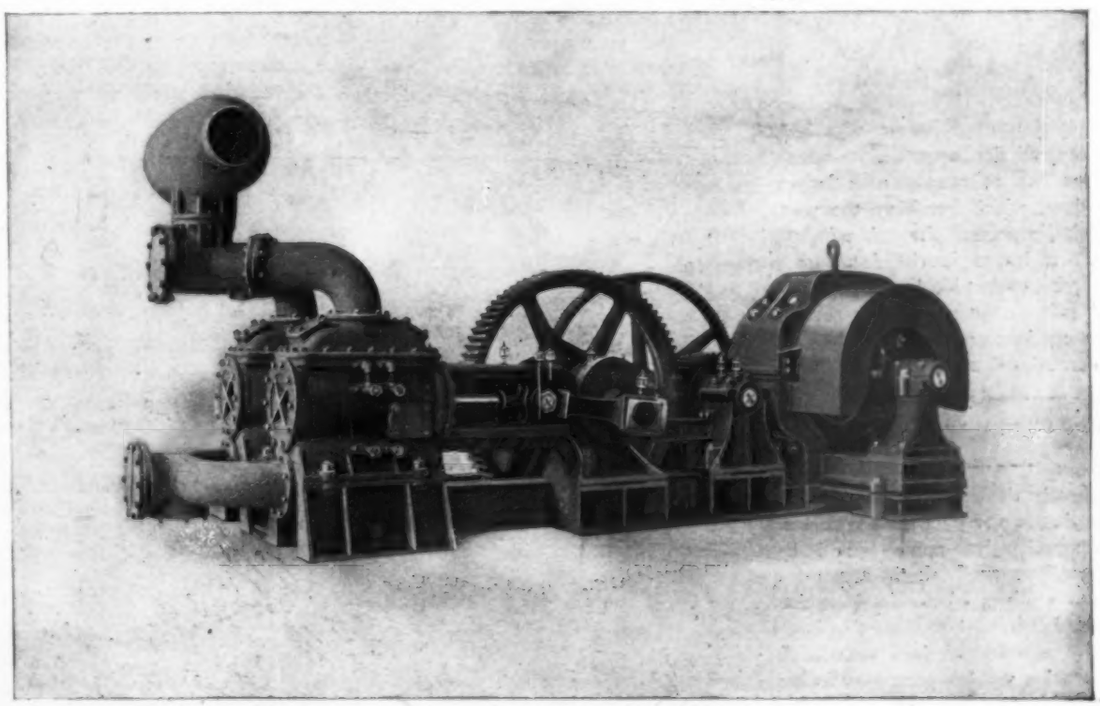
The station pump and motor also illustrated herewith, is part of the electrical pumping equipment of the Colorado Fuel and Iron Co.'s mines at Rouse, Col. The pumps, two in number, are double-acting duplex with water ends and cylinders 9½ inches by 12 inches, geared to a 110 horsepower motor. These pumps have each a capacity of 600 gallons per minute against a head of 600 feet.

In the interior of the extinct volcanic crater, Aso San, 30 miles from Kumamo-



A 6x6 Duplex Sinking Pump, with 90 H. P. Waterproof Induction Motor

to, Japan, 20,000 people live and prosper. The vertical wall of the crater is 800 feet high. The inhabitants rarely make a journey into the outer world, but form almost a little nation by themselves.



General Electric 110 H. P. Direct Current Motor, Driving Double Acting Horizontal Duplex Pump, 9 1-2x12 Cylinder. Capacity 600 gallons per Minute Against 400 Feet Head, Colorado Fuel and Iron Co., Rouse, Colo.

PREPARING PEAT FOR FUEL.

Peat is all organic matter, formed from mosses and other minor plants, which have been submerged in water and thus preserved in the bogs. As it exists in the bogs, says the Engineering Magazine, the largest constituent is water, dry matter forming only about 10 per cent of the total weight. In fact, the drying of the peat is everywhere regarded as the most troublesome point, for it is impossible to remove the water economically in any artificial way, either by pressure or by heating in kilns or kilnlike appliances; the peat must be dried in the open air, and the preparation thus becomes dependent on the climate.

The most ancient method of digging peat, still much used, is the simple one of cutting it by hand with a spade in regular, rectangular pieces, which are then spread on the levelled surface of the bog and dried. At present this method is much used in the Netherlands and in Germany. Although it requires much labor, yet it will often give a very cheap fuel, especially where wages are low, a skilled laborer being able to work one metric ton of dried peat in a day.

In order to reduce the volume, peat milling machines have been commonly introduced into all European countries within the last fifty years. In these machines the fibrous structure of the peat is broken up, the mass kneaded, mixed, and somewhat pressed together; it contracts considerably in drying, the volume of the dried peat often being only one-eighth of the original. Thus the peat gains a very compact consistence, and bears a close resemblance to lignite, both in appearance and density. Most of these machines knead the peat as it is taken from the bog. The machines thus used consist of a hollow cast-iron cylinder or cone, in which rotate one or two rollers set with knives or screw-ridges, which break up the peat, mix it, and lastly press it through a mouth piece, which it leaves in the form of a continuous rectangular block. This block is wet and soft as the peat in its natural state, and is cut in pieces at proper lengths and then carried off to dry.

"MYSOPHOBIA," THE LATEST DISEASE.

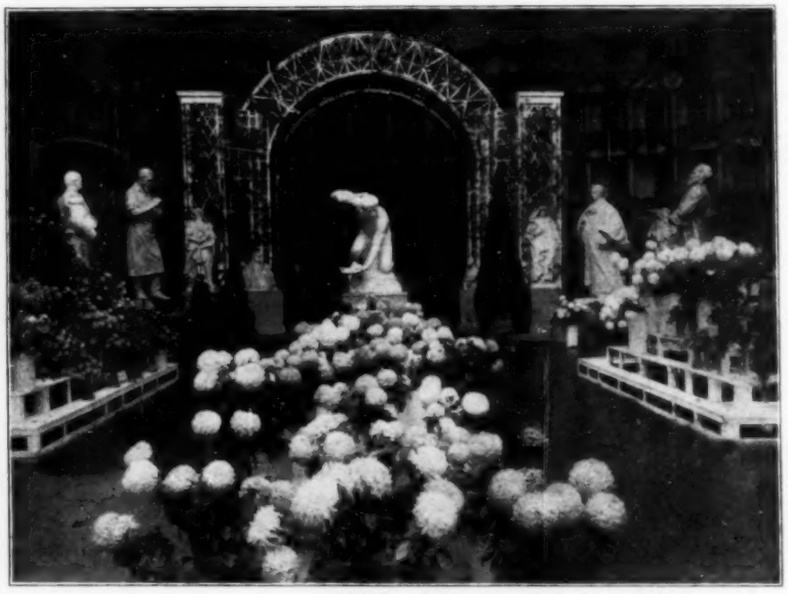
Mysophobia is the scientific name of a new disease that is worrying the physicians. A more comprehensive name would be "morbid fastidiousness." It is a natural result of the wailings of the food cranks, and the myriads of new diet ideas that have pervaded the country of late years. A medical journel says "A person suffering from mysophobia on taking his seat at the table begins by scrutinizing closely every article placed there for his use. He holds his tumbler up to the light to see if it is free from finger marks; or that the water contains no speck; he scans his napkin to make sure that it is immaculate, and one by one each article is critically passed in review. In advanced cases the sufferer mechanically wipes the various articles, using the napkin for the purpose."

Finally the patient gets so he is afraid to eat, fearing that his food is unclean or that he is violating some health law in eating it. He grows emaciated, listless, suspicious of everything, extremely nervous and sometimes ends in the madhouse.

The man who chops wood in the pine forests or engages in any energetic outdoor occupation is not troubled with this strictly city disease. His main anxiety is to get enough to eat, specs, microbes and other germs included.

CITIES PAUSE TO GLANCE AT FLOWERLAND.

Flowers—mounds, arbors aud bowers of flowers; large flowers and small flowers; dainty, timid flowers, and hardy, gruff "football-player-looking" flowers; sweet-scented and malodorous flowers; flowers representing every nation; flowers named for kings, queens, princes and presidents—in fact everything in the great, delightful kingdom of flowers, arranged in all designs that human ideas could conceive have delighted the flower-loving population of America's great cities during the past few weeks. Veritable dreamlands seemed the great inclosures where the multi-hued blossoms were exhibited. Intermingled with the beautiful works of nature were specimens of man's art. Statuary in marble

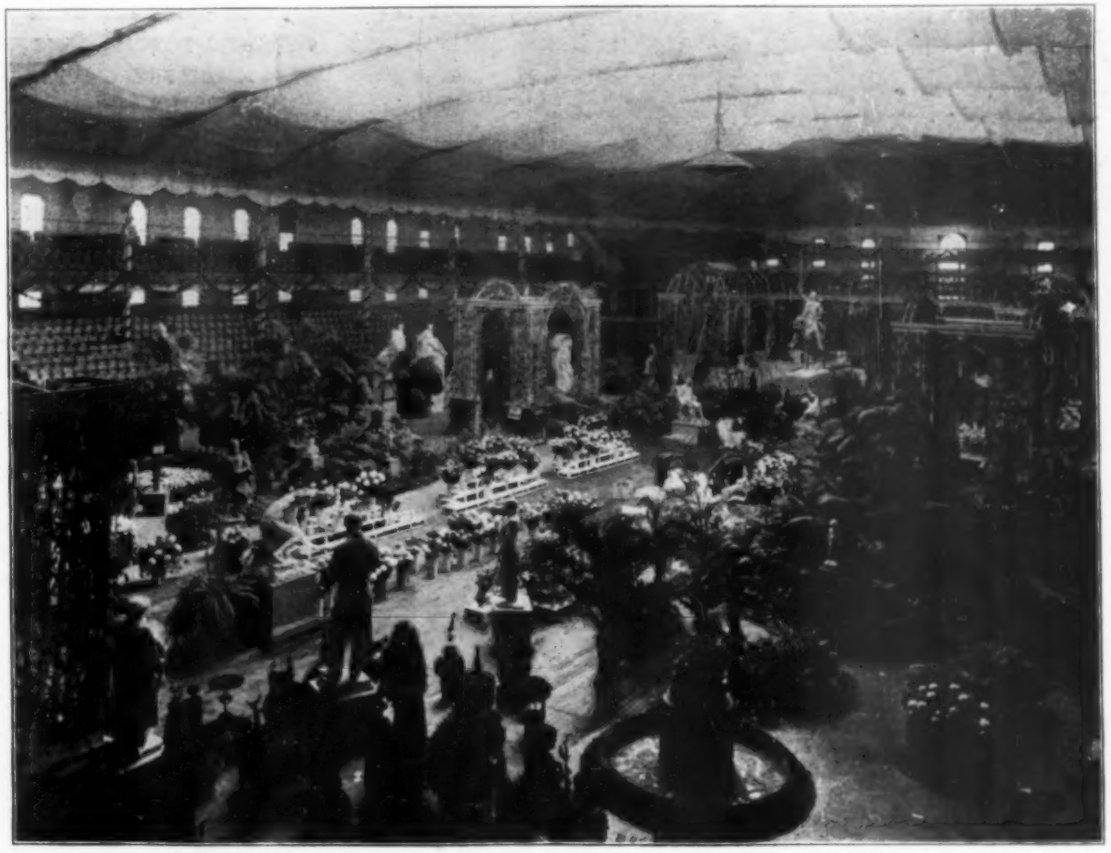


Chrysanthemums and Statuary

A Glance at the Chicago Show

and bronze stood forth in bold relief amid the fields of gorgeous coloring. And there was music to add to the enchantment—flowers, to delight the eye and sense of smell; music to charm the ear and statuary to please the admirers of the sculptor's art. And all was revealed in a soft mellow light that reminded one of dreams of fairyland.

The Chicago show, probably the greatest of them all, held forth in the new annex to the great art institute. Its world of chrysanthemum's and the splendid statuary about



General View of the New York Show.

which the mounds of flowers were grouped were the crowning features of the exhibition. In New York the flower show was held in the Madison Square Garden. The rose exhibit here was inferior, but a redeeming feature was the display of flowers sent from Europe. They were fresh and beautiful even after the long journey, and remained so throughout the exhibition. They were sent by W. Wells, an English specialist. Another meritorious show was at Kansas City at the Convention hall, and several other of the leading cities have all taken time from the rushing business season for a short visit to flowerland.

The Weekly Florist's Review, a world's authorities on all matters of flowers, has extensive descriptions of these exhibitions in its late issues.

The Persians have a different name for every day in the month.

POINTS FOR AMATEUR YACHTSMEN.

The following sensible advice, which should prove valuable to all amateur sailors, is from one of Boston's oldest and best known pilots.

You must believe that an approaching squall is the heaviest one you ever saw or heard of, and make up your mind to face the danger with coolness and decision. No man can tell how hard a coming squall may be, and sometimes they occur with very little warning, indeed. In the summer time, however, squalls can, as a rule, be seen long enough before they strike for the yachtsman to take ample measures for safety.

When the squall is seen approaching, anchor if possible under the lee of an island or some other land, out of the tide. That is the very safest thing to do. And don't forget to keep out of the tide, for if you are in a tide-way the water is rougher, it brings the yacht broadside to the wind, unless setting just right, and makes her liable to capsize. If the anchorage is out of the tide, the boat swings head to the sea and rides easily.

Most summer squalls come on the flood tide. Why this is I don't pretend to say, but my experience of thirty-five years confirms the statement. There are exceptions, but in nine cases out of ten the rule will prove true. That being the case, when the tide is flood the sharpest lookout should be kept, although the competent skipper watches the weather closely at all times. If rain comes before the wind you never can tell what is back of it. If the wind comes first, the squall is likely to be of short duration, for the rain which follows kills the wind and beats down the sea. A second squall in the latter case must be looked for, however, for it is likely to follow.

If there is no lee under which you can run and anchor, or there is no time to do so, then get the sails off the yacht as quickly as possible and furl them snugly. If you are in a sloop, lower the jib first, so that she can be luffed up easily and pointed in the direction from which the wind will come. The idea that a squall can be shaken off is a false one, and should not be countenanced for a moment. And don't forget when a squall is approaching to close the cabin or cuddy up tightly, seeing to it that no one remains inside. In squally weather never have any one in the cabin when the sails are up. There have been too many instances where people have been drowned in cabins who otherwise might have been saved.

The vast majority of mill workers in Japan are children. At one mill at Osaka, 2,600 workers are under 15 years of age and operate only 3,700 spindles.

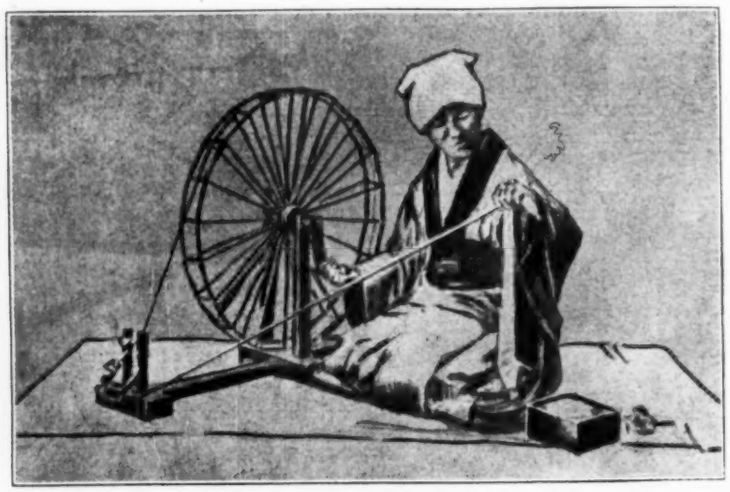
THE BOY IS COMIN' HOME.

John Mervin Hull, in November Lippincott's

I tell you it is busy times jest now for me and marm,
The Boy is comin' home to spend Thanksgivin' on the farm;
'Tis ten long years since he went West to mingle in the strife,
He's done first-rate, and, furthermore, he's got a Western wife.
We got the letter yesterday, and marm she laid awake
Full half the night to praise the Lord and think what she must bake.
If I should feed the turkey now as she declares I must,
Why, long before Thanksgivin' he would swell all up and bust;
I've had to grind the choppin'-knife and go to choppin' mince,
And things are brewin' rich and fine and fit to feed a prince.
The Boy, he writ for chicken-pie, "With double crust," says he,
"And mixed with cream, that lovely pie you used to make for me."
He wants a big red apple from the hillside Northern Spy,
And butternuts,—I've got 'em round the stove-pipe, brown and dry;
He wants to lay the fire himself with maple hard and sound,
And pop some corn upon the hearth when all are gathered round.
He wants the things he used to have when he was but a lad,
'Tis somewhat strange, it may be, but it makes us mighty glad;
We're both a little whiter, but our love, depend upon't,
Is jest as green and stiddy as the hills of old Vermont.
It flustered marm a bit at first about the Western wife,
What she should do for one so fine and used to city life;
But tucked between the Boy's big sheets she found a little slip,
She read it with a happy tear, a gently quivering lip,
"Dear mother," them's her very words, "I write this on the sly,
So don't tell John, but make for him a big, big pumpkin pie;
I know it will delight him, for he still is but a boy,—
His mother's boy,—and so he fills his wife's glad heart with joy."
And so, you see, 'tis busy times jest now for me and marm,
The Boy is comin' home to spend Thanksgivin' on the farm.

JAPANESE WOMEN LIVE AS SLAVES.

The Japanese woman is a slave in fact if not in name. From her earliest years she is condemned to earn her daily rice by labor often ill-proportioned to her strength. Custom dictates that she must be sacrificed to the men of her family, must keep their home in order, must care for their physical needs, must if necessary consent to be sold to a life of degradation to pay for the education of her brothers. While yet a child she goes about her household tasks carrying an infant on her back, a burden from which she is freed only when motherhood has given her daughters on to whom to shift this care. Since the Japanese house is built open in front the housewife must perform her manifold duties in full view of the public. It is not strange therefore that in country districts women prefer to do their work in the open air, to spin and weave out of doors in front of their narrow homes.



Japanese Woman Weaver

GERMAN SUBSTITUTE FOR CELLULOID.

The extensive commercial use of celluloid has caused a great many people to try to find substitutes for, or imitations of, it. In Germany a popular imitation has been made by dissolving in 16 parts—by weight—of glacial acetic acid, 1.8 parts of nitrocellulose, and adding 5 parts of gelatin. Gentle heating and stirring are necessary. After the mass has swollen, it is mixed with 7.5 parts of alcohol (96 per cent), and stirring is continued. The resulting product is poured into molds, or, after further dilution, may be spread in thin layers on glass. As an underlay for sensitive photographic films, the material has important advantages, not the least being that it remains flat in developing.

PONY PUZZLE SOLVERS.

Many different solutions of the "Trotting Pony puzzle" published in the November 1 issue of Popular Mechanics continue to pour into the editor's office. Others, besides the list published last week, who have succeeded in finding the correct solution, are:

George G. Helde, Central, N. M.
Miss Madeline Kelly, Woonsocket, R. I.
Miss Frances Kelly, Woonsocket, R. I.
Mrs. J. A. Blaisdell, Olivet, Mich.

NURSING BOTTLE HOLDER FOR BROOKLYN FATHERS.

An invention that has created rejoicing has been invented by one of the suffering baby carriage pushers of Brooklyn. Heretofore it has been that the fond father has been forced to bend over the rear of his baby carriage, holding the handle with one hand and pressing the nursing bottle to baby's mouth with the other. He had to do this to keep the drip from falling on his patent leather shoes and from soiling the silken covering in the buggy. But the era of frock coated and silk-hatted papas lined up of a Sunday along the park walks thus holding the nipple to baby's mouth delicately between thumb and forefinger, is soon to end. An automatic nursing bottle holder for baby carriages has been invented. Of course the inventor of the device is a Brooklyn man. Necessity is the mother of invention, and where else could there be found greater necessity of such an invention? His name is Louis C. Feld, and already it is proposed by the United Brooklyn Nursing Father's League to erect a monument to him when he dies.

Brooklyn Father's Invention

PRACTICAL WORK FOR ENGINEERING STUDENTS.

As regards the education of engineers, there is a growing opinion that the instruction given in our universities and technical colleges needs to be supplemented by concurrent practice in actual engineering work. There is a complaint that the teaching is too academic. Moreover, it is thought that the university terms, occupying on the whole not more than seven months of the year, are too short for the proper training of engineering students, and involve unnecessary breaks in their work. It has been suggested, therefore, that students in engineering should divide the session into two parts, and should spend six successive months in each year at the university or technical college, and the remainder of the year in engineering practice. The arrangement would certainly prove advantageous to the students, and might be equally so to the professors, who would thus obtain a continuous period of leisure for their own investigations or private practice.—Sir Philip Magnus, in The Engineering Magazine.

TYPE OF SECESSION ARCHITECTURE.

"Secession architecture" is used by the architects in describing the magnificent Mines and Metallury building at St. Louis World's fair. "It means," says Theo. C. Link, architect of the building, "architectural liberty and emancipation, with a strong plea for individuality. It is a breaking away from conventionality in design."

The elegant facade, a section of which is shown in the accompanying illustration, will be adorned with sculptured panels, illustrating in bold relief mining and metallurgical operations. The background of the sculptured figures will be of a rough golden colored glass, which will be illuminated at night and show, the figures in bold silhouette.

Section of Facade Mines and Metallurgy Building

An artesian well, 1,350 feet deep has been sunk under the new government building in Chicago.

An automobile climbed Mt. Washington from the old Glen house to the summit, traveling 8 miles and ascending 5,000 feet in 50 minutes. Teams require four hours to go up.

PHOTOGRAPHING FISH IN THE WATER.

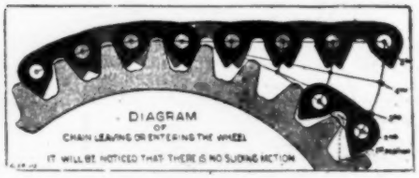
Photographing living fishes just as they swim in the water is a new and delightful art that is adding greatly to the scientific knowledge of the inhabitants of the deep. No one who has not seen the photograph of a fish in the water can realize how little it resembles the picture of a fish that has been taken from the water. At present the art of photographing living fish in the water is confined to the aquarium, but in future it may be that the deep sea diver can take his camera with him and photograph fishes just as they appear in their natural elements. Slight inroads have already been made into submarine photography, and fairly good pictures have been taken with cameras especially constructed for photographing under water. These do not show the fishes, however, or other inhabitants of the deep. The most interesting pictures of live fishes have been recently taken at the New York aquarium. The fish is transferred to a small tank of especially clear glass with the long sides so close together that the fish must remain approximately in one position.

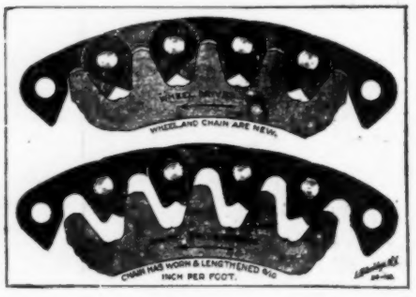
SHOP NOTES

A WEAR-COMPENSATING GEAR.

A new chain gear is being introduced here from Europe, and will be of special interest to those having to do with automobiles. The links and teeth work together like two properly made gear wheels. The only parts needing lubrication are the pins which unite the links. The Electrical Age says:

"With such a gear, protected from dust and dirt and working through a bath of oil, the loss of power is very slight and the wear upon it is insignificant. But





these are conditions which can but seldom be met.

"Under ordinary conditions wear begins at once, and proceeds rapidly. The result is a lengthening out of the chain, bringing the links further part, and at once destroying the accuracy of the pitch line upon which depends the absence of sliding friction in the working. Teeth and links begin to cut and rattle, and soon such a chain is using up a large part of the power which it should transmit. Bicycle riders discovered this to their cost, and in later days the auto-car owners found themselves confronted with the like trouble.

USED SAWED TIES AND DIDN'T KNOW IT.

A railroad contractor tells a good story in the Electrical Age. Some years ago he was building track for a big road which had a strict rule that all railroad ties must be hewn and not sawed. He ran across some very fine oak ties one day, but they had been sawed in a little mill in the mountains near the work. One day he received an order to put in a siding quick as possible. He says:

Here was our chance! But there were the tell-tale saw marks on the ties, and Engineer H—— had the reputation of being the hardest material inspector to impose upon in the company's employ. But a plan suggested itself. I called in the master carpenter and bridge builder.

"How many jack-plane bits have you got?" I asked.

"About two dozen."

"And how many plane-blocks?"

"Half a dozen."

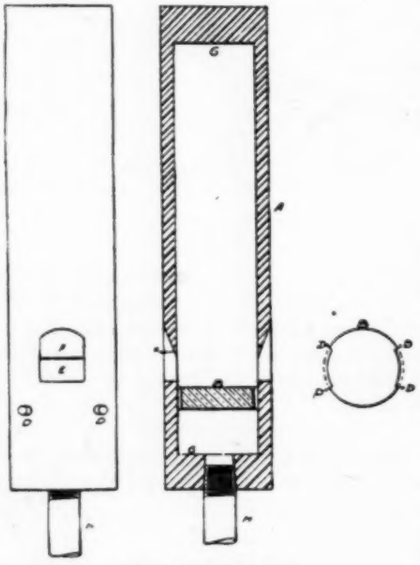
"All right," I said; "take them up to the mill and teach the men to jack off those ties so as to get out every saw mark, but not to make them look too smooth."

The bits were well rounded.

We allowed the mill owner five cents a tie, and he gave the men two cents as piece work and so got the job rushed. Engineer H—— was so delighted with the ties that I got him to allow us an extra five cents each. He never suspected that I had led him into a serious infraction of the company's rules.

HOME-MADE STEAM WHISTLE.

The accompanying sketch shows how a correspondent of Steam Engineering made a steam whistle from a piece of 3¼-inch boiler tube. Practically the only item of expense was the labor involved and the home-made whistle was found to give as good satisfaction as any regulation whistle would have done.



Boiler Tube Whistle

The drawing shows the construction, A being the piece of boiler tube forming the bell of the whistle. The center piece B was fitted in place and secured by four studs D. Two sides of this piece were filed away so as to provide passages for the steam. Above the passages, and in line with them, rectangular holes E were cut in the bell, one on either side, the upper edges being filed down, as at F, to form sharp edges. Two solid ends G G were then welded into the bell and the bottom one drilled and tapped for the steam pipe H, after which the whistle was complete.

AMERICAN NAVY WANTS MACHINISTS.

The young man who is a competent machinist and wants to see the world can do so and be saving quite a little money while seeing. Uncle Sam wants good machinists for his navy and can use a lot of them on a large number of vessels now being commissioned. There is, therefore, good opportunity for aspiring young ship engineers to enter the navy as machinists and compete in the examination to be held in February next for warrant machinists. The pay of a warrant machinist is $1,200 to $1,800 a year for sea duty, according to length of service. Machinists who have had no experience at sea with marine engines will be enlisted as "machinists, second class," at $40 a month. Machinists who have had experience at sea with marine engines for one year may be enlisted as "machinists, first class," at $55 a month.

Young American marine engineers, with licenses as such, will be enlisted as machinists, first class, and given appointments as chief machinists from date of enlistment at $70 a month, providing they are qualified to take charge of a "watch" under way in the engine room of a modern vessel. The pay of warrant machinists is $1,200 a year for the first three years; $1,300, second; $1,400, third; $1,500, fourth, and $1,800 after twelve years.

SEVERE TEST FOR LIFE FLOAT.

The Carley Life Float, described and illustrated in the Oct. 18 issue of Popular Mechanics, is soon to be submitted to a remarkable test on the Nantucket shoals, to demonstrate its efficiency. The test will be made during a heavy storm, and the float weighted with lead will be sent adrift some distance out at sea and allowed to drift in with the tumbling waves across the Nantucket shoals, with its shifting sand bars and swift currents. Notwithstanding the hazards to be encountered in the test, the manufacturers of the float are confident that it will reach the shore without capsizing.

In the event of war, Germany could put into the field a land force of 5,579,872 men.

BRAZE TEMPERING OF BAND SAWS.

I have no trouble with bent brazes, and am sure, if you will do the work as I suggest, bent brazes will be a thing of the past with you, writes a correspondent in the Woodworker. My process requires neither extra time, money, labor or skill, and is very simple. After clamping the hot irons on the saw to make the braze, remove them just before the red changes to black, and cool as quickly as possible with wet towels or "waste." It is impossible to get the braze too hard by this process. This is very easy to try, as you do not go to any extra work, and I am sure, if the work is done properly and quickly, you will get good results.

There is one thing certain, if you harden a braze you must reduce it from a high to a low temperature quickly. The only reason it is difficult to get the temper high enough in a braze is, you cannot cool it until you release the clamp, and you cannot release the clamp until the solder has set, consequently when the cooling process commences your braze is not quite hot enough to get that portion of the saw as hard as the balance of the blade. But it will be hard enough to prevent it from bending.

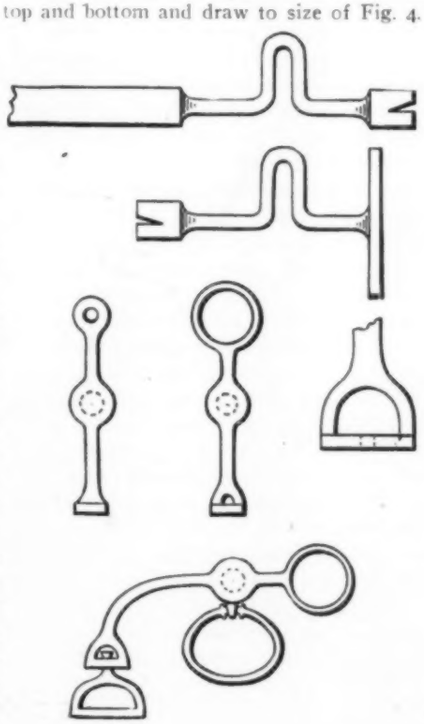
METAL HOSE.

Metal is about the last thing one would regard as a substitute for rubber, and particularly where great flexibility is a quality which is absolutely essential; but this has been done recently, says Kuhlow's German Trade Review, and a hose has been manufactured out of a steel tape which has all the flexibility of a tube made of rubber, and also several advantages which the rubber does not possess, such as great durability in all classes of service and the power to resist the action of heat and corrosion as well as that of acids and other chemicals. It is, therefore, adapted to the conveying of steam, compressed air, water, oil, acids, alkalies, gases, benzine, naphtha and gasoline. No rubber whatever enters into the manufacture of this hose. It is constructed entirely of a metal tape, which is rolled up in the form of a spiral, so that the edges overlap and fit into each other without in the least interfering with its flexibility. As the tape is rolled up it forms a groove for the reception of a packing which is completely enclosed in the mail as it rolls, where it remains fully protected from external or internal wear and tear. The packing causes the tubing to be perfectly tight, while the jointing induces a flexibility superior to that of a rubber hose of equal dimensions. As this hose will not kink, crust or blister it can always be relied on to deliver its full capacity, which is greater than that of rubber hose of equal dimensions, all connections being outside. The single hose is recommended for all ordinary purposes; but where it is designed to convey air or steam under pressure, a double hose is made which will, it is claimed, resist a pressure of 3,000 lbs. to the square inch. This is constructed by placing one metallic hose within another, the coils of each running in opposite directions. This combination enables it to withstand the hardest usage successfully. This hose has been in actual use in Germany, where it originated, to demonstrate its serviceability. It has been adopted by the German navy and by the North German Lloyd. It has also done excellent service at the Liverpool docks, where over 1,000 feet of it are used to convey steam from the boilers to the grain elevators.

FORGING A CURB BIT.

One of the fine forgings we are very often called upon to do, is a curb bit, says a correspondent in the American Blacksmith. In making this we take a piece of mild steel and forge the mouth part first, as Fig 1, making a spade, or not, as the customer desires, and forging to the required length and size. We next cut it from the bar, allowing stock enough at each end for the cheek pieces. Then split the ends, as in Fig. 2, turning them back and flattening them, so as to get a cheek piece, at least an inch wide. Next forge these pieces to the shape of Fig. 3, leaving the lower end 3/8 inch thick.

The next step is to punch a hole at the top and bottom and draw to size of Fig. 4.

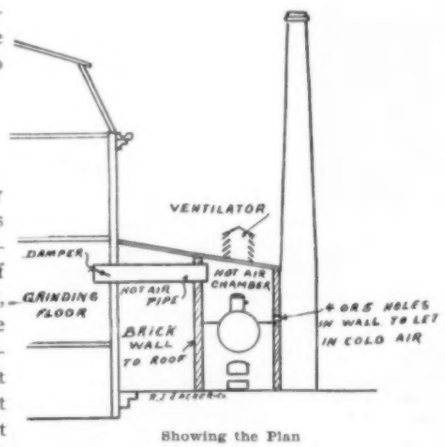


The Process of Forging a Curb Bit

We then punch or drill a hole in the lower end, as Fig. 5. Now we shape the cheek pieces to suit, and forge the lower ring by punching out a piece and drawing it over the horn. We leave a stud projecting which we pass through the hole shown in Fig. 5, and head it down inside the stirrup, over a washer. Then we split out the washer, which should have been counter-sunk on the upper side, and the bit is done.

PLAN FOR HEATING A MILL.

A correspondent of the American Miller tells how he heats his mill without any expense, by utilizing the waste heat from the boiler. He says:



Showing the Plan

"The sketch shows how we brick in the top of boiler to roof and then use a 20-inch galvanized iron pipe as a hot air flue to the grinding floor. We have a ventilator above the boiler which we open in the summer time to let the hot air escape out of doors. We also close the damper in the hot air flue.

A TRUE STORY.

His arm was round my shoulder laid,
He pressed my head against his breast;
I sighed, but not a word was said—
I heard his watch tick thro' his vest.

His fingers firm upon my cheek
Still at his will compelled my face;
I only felt, I could not speak,
Fast fettered in that close embrace.

Pain racked, sore tried, I vain would flee,
His voice my futile struggles stilled—
Ah! Just a little patience,—see?
I rise—I smile—my front tooth's filled.
—Dental Review.

A piece of camphor gum is a very good indicator of what the weather is going to be. If, when the camphor is exposed to the air, the gum remains dry, the weather will be fresh and dry, but if the gum absorbs the moisture and seems damp it is an indication of rain.

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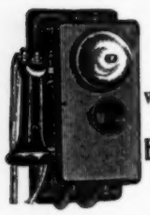

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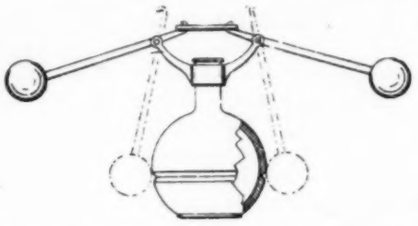
NOVEL FIRE EXTINGUISHER.

The cut explains the idea of a self-acting fire extinguisher. A pair of iron balls are held in an elevated position by a ring of



wire made of a metal which will easily melt. When the wire fuses the weights fall, smashing the vessel and allowing the fire extinguishing chemicals to escape.

KEEPS THE WEEVIL OUT.

A Kansas man who is credited with several inventions has devised a weevil-proof grain bin. It consists of a series of pine boxes, each a foot square, bored full of three-quarters inch holes. These are placed in the bin and the air is forced through the small holes and circulates all up and through the wheat. Screen wire is wrapped around the boxes to prevent the grain passing through the holes. That is all there is to it so far as the operation is concerned.

The first series of boxes run horizontally a few inches above the floor. They are placed lengthwise of the bin at intervals of six or eight feet as necessary. Connecting with these are upright boxes at similar intervals, passing up to a ventilator above. These boxes have a series of slides so that the box can be made tight at the bottom and as high up as necessary, depending upon what point it is desired that the air should emerge into the wheat. They are closed at the top so that the air to get out must pass through the wheat.

Fans are placed a the ends of the horizontal boxes, by which air is forced into them and out through the wheat. These fans can be operated by hand power, windmill or any other power desired. By means of the fans bi--sulphide of carbon or any other insecticide can be forced through the wheat, in case the weevil is already in it.

X-RAY TO TEST DIAMONDS.

In detecting a false gem from a genuine, the X-ray can be relied on with absolute certainty. Diamonds, as is well known, are pure carbon; and carbon, which is opaque to ordinary light, is transparent to the Roentgen light, while glass, which is transparent to ordinary light, is opaque to the Roentgen ray. On an X-ray photograph of a real diamond nothing will show but the shadow of the gold setting.

An interesting experiment was made recently in watching with the aid of an X-ray machine and a fluorescope, motions carried on inside of an opaque body. A goose was fed with food mixed with subnitrate of bismuth salt, which absorbs the X-ray. The passage of the food down the long neck of the goose could be plainly traced by the moving shadow cast on the fluorescope screen.—Leslie's Monthly.

AN OLD PUZZLE.

It's an old puzzle, says a writer in the American Machinist, but will be new to many readers. "Cut a block of wood that will exactly fit a square, a round or a triangular hole." These three holes are

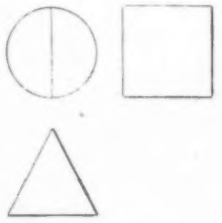


Fig. 1.

Fig. 2.

shown in Fig. 1 and a little reflection will show that these figures represent also three views of the block of wood when completed. The block is shown in perspective in Fig. 2.

The writer then calls attention to the

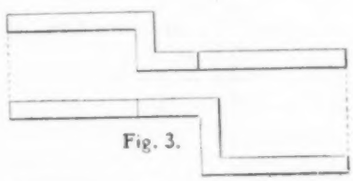


Fig. 3.

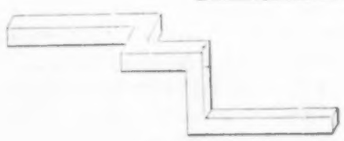


Fig. 4.

value of a perspective drawing to make plain what in the plan or elevation may be hard to understand. He illustrates this with Fig. 3 and Fig. 4. The two drawings in Fig. 3 being difficult to catch even when the dimensions are inserted, but the perspective sketch, Fig. 4, makes it all plain.

NEW FEEDING PROCESS FOR STOCK.

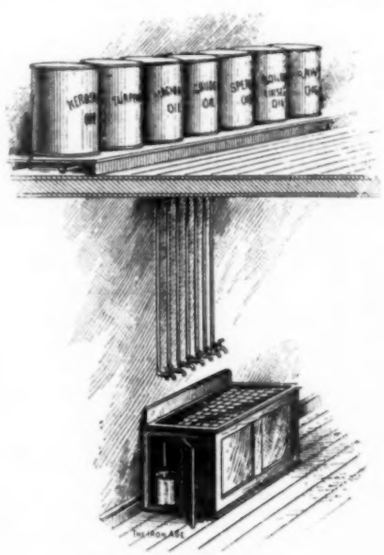
The invention consists of a large case made of galvanized iron and three and a half feet wide and five feet long. This case contains a number of shallow drawers, in which corn can be placed, in layers about three inches deep.

All around the outside of the case, on the top and four sides, is a layer of common wood moss, such as grows in the woods everywhere. This moss is about three inches thick and is compressed by wire netting, so that it forms practically a sponge, capable of absorbing a large amount of water.

The corn is placed in the drawers and water poured into the moss. Almost immediately a process of sprouting begins that in three or four days converts the hard grain into a mass of tender young shoots fed by the softened pulp. It is ready for feeding and is taken out of the drawers, fresh corn being substituted and the progress of sprouting repeated.

CONVENIENT METHOD OF KEEPING OILS.

A retail dealer in Connecticut, who carries seven kinds of oils, has arranged the convenient method shown in the cut. A pipe leads from each tank, with a faucet placed at the lower end. Any drippings pass through a wire screen into pails set below.

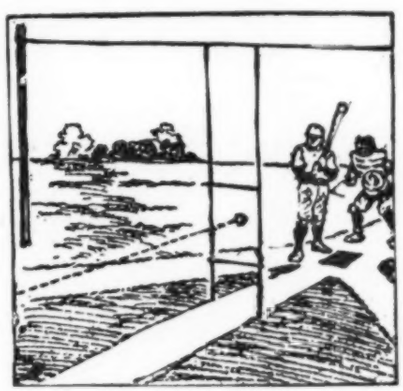


Oil Tanks and Pipes.

MECHANICAL BASEBALL GAUGE.

Invention That May Settle Long Disputed Question.

A device to determine as to whether the pitcher in a baseball game throws the ball accurately and to enable the umpire to determine positively whether "balls" or "strikes" are pitched has been invented by Edward Manley of Chicago. The device consists of a rectangular frame of sufficient width and height to embrace a transverse section of the area within which the ball can be safely pitched. The frame is made of light cord or paper so that it constitutes no actual obstruction to the field. The frame is suspended from a horizontal cable hung from posts set in the ground on either side of the diamond and far enough in advance of the home plate to give the runners free range of the other bases. The inventor claims that the device will also be of great assistance to the pitcher, as it constitutes an indicator or guide by which he is enabled to more accurately pitch the ball within safe limits. The indicator is placed across the proper trajectory of the ball so that if correctly pitched it will pass through the frame and be counted a strike against the batter whether he hits it or not.



Tells Balls and Strikes

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